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“Vibration Monitoring and Damage Quantification of Faulty Ball Bearings”

More often than not, the rolling element bearings in rotating machinery are the mechanical components that are first prone to premature failure. Early warning of an impending bearing failure is vital to the safety and reliability of high-speed turbo-machinery. Presently, vibration monitoring is one of the most applied procedures in on-line damage and failure monitoring of rolling element bearings.

This paper presents results from an experimental rotor-bearing test rig with quantified damage induced in the supporting rolling element bearings. Both good and damaged radial and taper ball bearings are used in this study. The vibration signatures due to damage at the ball elements and the inner race of the bearing are also examined. Vibration signature analyzing schemes such as frequency domain analysis, and chaotic vibration analysis (modified Poincare diagrams) are applied and their effectiveness in pinpoint damage are compared in this study. The size/level of the damage is corroborated with the vibration amplitudes to provide quantification criteria for bearing progressive failure prediction. Based on the results from this study, it is shown that the use of the modified Poincare map, based on the relative carrier speed, can provide an effective way for identification and quantification of bearing damage in rolling element bearings.

About the Speaker.....

Dr. Choy obtained his Ph.D. degree in Mechanical Engineering at the University of Virginia in 1977. Between 1977 and 1983, Dr. Choy was a research engineer with Joy Manufacturing Company in Buffalo, New York. He then embraced the academic career and became an assistant professor in 1983 and a professor of Mechanical Engineering in 1993 at the University of Akron. While working in both industrial and academic positions, Dr. Choy has acquired extensive experience in the areas of sensor development, machine health monitoring, dynamic simulations of mechanical systems and nanotechnology. In the last 10 years Dr. Choy has developed an integrated system for vibration and acoustic sensing, machine health monitoring, and life prognosis of bearing, gear and seal systems. Dr. Choy has been the P.I. of numerous government and industrial funded research projects (over 3.5 million dollars) including agencies such as National Science Foundation, DOD and NASA. Due to his outstanding contributions in the areas of machine health monitoring, Dr. Choy had been awarded the honor of fellow of ASME in 1996. Dr. Choy has published extensively (over 150 publications) in scientific journals and through national and international professional conferences.

Wednesday, December 8, 2004

“Vibration Monitoring and Damage Quantification”

By

Dr. Fred K. Choy

Of

The University of Akron

Technical Chairperson

Mark Carlson
The Timken Company

Location

Lolli’s Restaurant
Corner of Belpar and Dressler in Aston Park near Belden Village

Social Period starts at 6:00 p.m. Dinner at 6:30 p.m. Meeting at 7:30 p.m.

Dinner Reservations: Reservations can be made by contacting
Chris LaPole (The Timken Company) at 471-4251 {chris.lapole@timken.com}.

Reservations can be made up to 4:00 PM on December 8

All walk-ins between 6:00 p.m. and 6:30 p.m. are accepted

***Note: The Chapter must pay for all dinner reservations. “No-shows” may be billed if the reservation is not cancelled by 4:00 PM, December 7.

Dinner Selections: Steak, Chicken Bordelaise, Vegetarian, or Orange Roughy (Fish)

Dinner Prices

ASM Members and Spouses: \$16.00

Non-members and Guests: \$18.00

Retirees and Students: \$8.00

**Please provide your name, company affiliation, and dinner selection
when making reservations.**

*** SPOUSES AND GUESTS ARE WELCOME ***

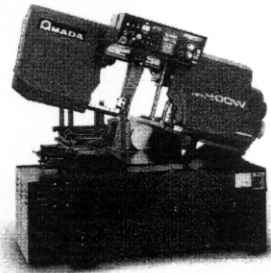
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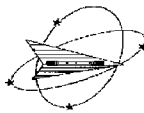


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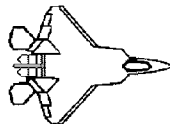


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CANTON - MASSILLON CHAPTER

www.asm-canton.org

**2004-05 ASM Canton-Massillon Chapter
Technical Meeting Schedule**

2ND Wednesday Each Month

<u>Date</u>	<u>Topic</u>	<u>Speaker</u>
September 8, 2004	Cold Drawing of Tubes on a Movable Mandrel	Craig Darragh
October 13, 2004	Design for Six-Sigma Tools	Dr. Michael Zelin
November 10, 2004	Successful Project Development	Pete Jarocewicz
December 8, 2004	Vibration Monitoring and Damage Quantification of Faulty Ball Bearings	Dr. F.K. Choy
January 12, 2005	Process in Growth of Diamond Crystal	Dr. Reza Abbaschian
February 9, 2005	Tire Design for Passenger Cars	TBA
March 9, 2005	Shock Peening or Dennis Huffman	TBA
April 18, 2005	Surface Engineering - Joint Meeting w/ STLE	Gary Doll
May 2005	Blacksmithing Tools and Metallurgical Skills	Jerry Wolfe
June	TBA	TBA